4.0 Environmental Consequences

4.1 Land Use

4.1.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. The main area of the Y-12 Complex is largely developed and because of the Site's defense support, manufacturing, and storage facilities, the land is classified in DOE's industrial use category. The Proposed Action, to construct a long term source of steam production for the Y-12 Complex would be consistent with the current land use patterns at the Y-12 Complex. The Proposed Action would use commercially available packaged boiler systems technology and would be constructed on the site that is currently occupied by office buildings. Fuel oil storage would be diked and located on a vacant area near the proposed location for the new boiler house. There would be no alterations of current land use patterns or planning resulting from the Proposed Action.

Operation. Operation of the Skid Mounted Gas Fired Boilers would be consistent with the current land use patterns at the Y-12 Complex. There would be no alteration of current land use patterns or planning resulting from the Proposed Action.

4.1.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. In general, construction activities under this alternative would consist mostly of internal building modifications and renovation at the existing Y-12 Steam Plant. Land uses at the Y-12 Complex would be compatible with surrounding areas and with land use plans. If external building modifications and renovation occur land use impacts would include disturbance to areas surrounding the existing building for construction laydown areas; however areas surrounding the existing Y-12 Steam Plant have been previously disturbed; therefore, there would be no alteration to the current land use patterns or planning.

Operation. Under this alternative, operations would not impact land use resources because activities would be substantially identical to existing operations and would be located in previously disturbed or heavily industrialized portions of the Y-12 Complex.

4.1.3 Alternative 3 – No Action Alternative

Under the No Action Alternative, impacts would be similar to those discussed above for Alternative 2. Under this alternative there is a potential for external building modifications and renovations and would occur as necessary; however areas surrounding the existing Y-12 Steam Plant have been previously disturbed; therefore, there would be no alternation to the current land use patterns or planning.

4.2 Geology and Soils

4.2.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Construction of the new boiler house and fuel oil storage facility may require the top five feet of soils to be removed and replaced with engineered fill after the removal of the existing concrete slabs. New concrete foundation and slabs will be constructed to support the boiler house and the packaged boilers. Any additional impacts on geological resources, and the hazards posed by geological conditions are expected to be minor. The bedrock at the Y-12 Complex is adequate to support structures using standard construction techniques.

The construction of the new boiler house and fuel oil storage facility would require grading and excavation of soil for a new building foundation and placement of tanks, secondary containment dike, and new natural gas line extension. The boiler house and fuel oil storage project area will be located on currently occupied sites. Soil characterization sampling has been completed and results provided in the BWXT Y-12 Complex report, *Steam Package Plant and Oil Tank Farm Report on Site Characteristics and Sample Locations* (RP-PJ-940107-A002).

Based on the seismic history of the area, a moderate seismic risk exists at the Y-12 Complex. The boiler house and fuel oil storage facility would be designed and constructed to meet all regulatory requirements.

There is a potential for soil disturbance as a result of the excavation, backfilling, and placement of a new concrete foundations and slabs. Excavation of approximately 900 linear feet of soil trenching will be required to tie a natural gas line extension in to the existing natural gas line. The potential for soil contamination from project activities would be minimized by complying with

DOE waste management procedures and existing the Y-12 Complex administrative controls. Disturbance of the EFPC will be avoided by use of an elevated pipe bridge.

Operation. No impacts to geology and soils are anticipated from the operation of the Proposed Action. The new facilities would have no added impact on geology or soils during operation because of site design and engineered control measures. Runoff control ditches would be utilized to minimize impacts if any should occur. The Y-12 Complex Spill Prevention Control and Countermeasures (SPCC) plan would also minimize potential impacts.

4.2.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. Under this alternative, construction activities would consist mostly of internal building modifications and renovation at the existing Y-12 Steam Plant, therefore there would be no disturbance to the geology of the site. There is a potential for soil disturbance as a result of the excavation, backfilling, and placement of foundations and slabs.

Operation. No impacts to geology and soils are anticipated from the operation of the Proposed Action. Control measures currently in place, such as the Y-12 SPCC plan would help to minimize potential impacts.

4.2.3 Alternative 3 – No Action Alternative

Under the No Action alternative, no new construction or land disturbing activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur. The No Action alternative would not result in any immediate changes to the current geology and soils at the Y-12 Complex. However, continued maintenance requirements would result in General Plant Projects spread over the useful life of the existing Y-12 Steam Plant.

4.3 Climate and Air Quality

4.3.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Under the Proposed Action, construction of the new boiler house and fuel oil storage facility would affect air quality temporarily.

During preparation and construction, the use of heavy equipment would generate combustion engine exhaust that contains air pollutants associated with diesel combustion (NO_x, CO, SO_x [sulfur oxides], PM_{10} and VOCs). Similar air emissions would be generated from delivery vehicles that bring supplies and equipment to the construction site and from construction workers that commute to work in their personal vehicles. There would be a relatively limited amount of construction equipment and small number of construction workers. The quantities of air pollutants produced by vehicles and equipment associated with construction would not be a substantial contribution to the total emissions from mobile sources that already operate in the area and would not be expected to significantly change air quality at the Y-12 Complex.

In addition, construction activities could generate an increase in fugitive dust (i.e., airborne particulate matter that escapes from a construction site) from earthmoving and other construction vehicle movement. Air emissions generated during construction would not be subject to additional permitting requirements, but would be subject to state regulations that limit fugitive emissions (TDEC Rules Chapter 1200-3-8). Appropriate mitigation measures would be implemented in accordance with TDEC Rules for Fugitive Dust. These measures include, but are not limited to the following:

- Use, where possible, of water or chemicals for control of dust associated with land clearing and construction operations.
- Application of asphalt, water, or suitable chemicals on dirt roads, material stock piles, and other surfaces which can create airborne dusts.
- Installation and use of hoods, fans, and fabric filters to enclose and mitigate release of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations.

The potential effect on ambient air quality from construction activities would be temporary and localized and would not affect the overall air quality of the region. The Proposed Action would not have a net effect on regional climatic conditions.

Operation. Under this alternative, the addition and operation of four 80,000 lb/hour water tube packaged boilers with low NOx burners would have an overall positive impact on the air quality. Currently at the Y-12 Complex there are three operating Wickes boilers each rated at a maximum steam output of 250,000 lb/hour a combined 750,000 lb/hour. These existing boilers can burn coal and natural gas. Combined steam output for the proposed boiler system would be 320,000 lb/hr. The new boilers would burn natural gas with fuel oil back-up. During natural gas curtailment operation (expected to be less than 50 days per year) one boiler of the proposed system would operate on Number 2 fuel oil. State issued clean air construction and operating permits would be obtained prior to construction and operating the proposed boiler system. The new permit limits for pollutant emissions (all pollutants) from the new boilers would be significantly less than the current permit limits for pollutant emissions from the old boilers. The new Y-12 Steam Plant would be designed to meet the new lower limits.

Table 4.3-1 displays a comparison of existing Y-12 Steam Plant emissions, current emission limits, and estimated emissions from the Proposed Action. Actual emissions are expected to be significantly lower under the Proposed Action versus current operations for Total Particulate Matter, Sulfur Dioxide, and Nitrogen Oxides. In addition, both metal and non-metal hazardous air pollutant emissions associated with the combustion of coal would be eliminated. Actual emissions under worst case fuel conditions are expected to be slightly higher, by 2-5 tons per year, for $PM_{2.5}$, PM_{10}, and Volatile Organic Carbons (VOCs). Carbon monoxide emissions are expected to be 82 tons higher under the Proposed Action versus current conditions. Increased carbon monoxide emissions under the Proposed Action are due to the large amount of natural gas burned along with No. 2 fuel oil during natural gas curtailment and does not violate air permits. None of the projected emission increases are considered significant for the purposes of non-attainment New Source Review or Prevention of Significant Deterioration permitting.

Once installed, the proposed system upgrades would not require additional workers, and therefore, no associated increase in emissions from private motor vehicles as workers commute to and from the site are expected.

Table 4.3–1. Air Emissions of Existing Y-12 Steam Plant and Packaged Boilers

	Existing Y-12 Steam Plant (Boilers)			Proposed Alternative Package Boilers	
	CY 2006 Emissions (tons/yr)		Concentration Allowable (permit)	Worst Case Fuel Scenario Emissions (tons/yr)	
Pollutant	Actual	Allowable	(lb/MM Btu)	Projected Actual	Maximum
Particulate	32	945	0.174	10	14
Sulfur Dioxide	2,286	20,803	4	13	31
Nitrogen Oxides[a]	654	5,905	–	42	60
Nitrogen Oxides (ozone season only)[b]	153.4	232	232 tpy	–	–
Volatile Organic Compounds[a]	2.3	41	–	7	9
Carbon Monoxide[a]	20	543	–	102	136

[a]When there is no applicable standard or enforceable permit condition for some pollutants, the allowable emissions are based on the maximum actual emissions calculation as defined in Tennessee Department of Environment and Conservation Rule 1200-3-26-.02(2)(d)3 (maximum design capacity for 8760 hours/year). The emissions for both the actual and allowable emissions were calculated based on the latest EPA compilation of air pollutant emission factors. (EPA 1995 and 1998. *Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources*. Environmental Protection Agency, Research Triangle Park, N.C. January 1995 and September 1998.)
[b]Monitored emissions.

Note: The proposed emissions are calculated based on a maximum heat input of 99 millions Btu/hr, and the projected actual emissions are based on a projected heat input of 75 millions Btu/hr.

4.3.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. Under this alternative, construction activities would consist mostly of internal building modifications and renovation at the existing Y-12 Steam Plant, therefore air quality and climate would not be impacted.

Operation. Operation of replaced/repaired boilers and associated auxiliary systems of the existing Y-12 Steam Plant would cause similar emissions as the current operations. As with the proposed action, a state issued clean air construction permit would be obtained prior to conducting the life extension project. Permit conditions would be incorporated into a revised operating permit for the existing boiler system. The new permit limits for pollutant emissions (all pollutants) from the boilers (post-life extension) would be significantly less than the current permit limits for pollutant emissions from the existing boilers (pre-life extension). Also, similar to the Proposed Alternative, some actual emission increases may be experienced due to normal operating fluctuations, however, none of the projected emission increases would be considered significant for the purposes of non-attainment New Source Review or Prevention of Significant Deterioration permitting.

4.3.3 Alternative 3 – No Action Alternative

Construction. Under the No Action Alternative, the Y-12 Steam Plant would continue to be a primary source of criteria pollutants. All criteria pollutant concentration expected would remain below national and TDEC standards, except for 8-hour ozone and $PM_{2.5}$, which currently exceeds standards throughout the region. No new construction or land disturbing activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur, therefore there would be no additional impact on the air quality and climate.

Operation. During current operations at the Y-12 Steam Plant emissions would stay the same, and may even increase due to a decrease in performance of aging equipment.

4.4 Noise

4.4.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. The onsite and offsite acoustical environments would be impacted during construction of the proposed boiler house and fuel oil storage facility. Construction activities would generate noise produced by heavy construction equipment, trucks and power tools. In addition, traffic noise would be expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site. The levels of noise would be representative of levels at a medium-scale construction site. Table 4.4–1 describes peak attenuated noise levels expected from operation of construction equipment.

Relatively high and continuous levels of noise in the range of 89 to 108 dBA would be produced by heavy equipment operations during the site preparation phase of construction; however, site preparation, heavy equipment noise would become more sporadic and brief in duration. The noise from trucks, power tools, and percussion equipment would be sustained through most of the construction and equipment installation activities on the proposed facility site.

Construction activities normally would be limited to daytime hours and thus would not impact existing background noise levels at night. As construction activities reach their conclusion,

sound levels on the proposed site would decrease to levels typical of daily facility operations (50 to 70 dBA). These construction noise levels would contribute to the ambient background noise levels for the duration of construction, after which ambient background noise levels would return to pre-construction levels (DOE 2001a).

Table 4.4–1. Peak Attenuated Noise Levels (in dBA) Expected from Operation of Construction Equipment

Source	Peak Noise Level	Distance from Source						
		15 m (50 ft)	30 m (100 ft)	61 m (200 ft)	100 m (400 ft)	305 m (1,000 ft)	518 m (1,700 ft)	762 m (2,500 ft)
Heavy trucks	95	84-89	78-83	72-77	66-71	58-63	54-59	50-55
Dump trucks	108	88	82	76	70	62	58	54
Concrete mixer	108	85	79	73	67	59	55	51
Jackhammer	108	88	82	76	70	62	58	54
Scraper	93	80-89	74-82	68-77	60-71	54-63	50-59	46-55
Bulldozer	107	87-102	81-96	75-90	69-84	61-76	57-72	53-68
Generator	96	76	70	64	58	50	46	42
Crane	104	75-88	69-82	63-76	55-70	49-62	45-48	41-54
Loader	104	73-86	67-80	61-74	55-68	47-60	43-56	39-52
Grader	108	88-91	82-85	76-79	70-73	62-65	58-61	54-57
Dragline	105	85	79	73	67	59	55	51
Pile driver	105	95	89	83	77	69	65	61
Forklift	100	95	89	83	77	69	65	61

Note: 1ft = 0.305 m.
Source: Golden et al. 1980.

Peak attenuated noise levels at offsite locations within the City of Oak Ridge from construction activities would be similar to background noise levels (53 to 62 dBA) as shown in Table 4.4–1.

The *Noise Control Act* of 1972 (42 U.S.C. §4901), and *Occupational Noise Exposure* (29 CFR 1910.95) include noise reduction and mitigation measures. For sound levels that exceed those listed in Table 4.4–2, feasible administrative or engineered controls would be used. If such controls fail to reduce sound levels to within the levels shown in Table 4.4–2, personal protective equipment (e.g., ear plugs) would be provided and used to reduce sound levels within acceptable levels. Continued compliance measures would be taken to ensure personnel do not experience hearing damage or loss.

Operation. Operation of the new packaged boiler system and associated systems would generate noise that is consistent with existing conditions. Operation under the Proposed Action would therefore have a negligible effect on ambient noise levels, and the facility would satisfy the noise regulations established by Anderson County (Table 3.4–1). Operation under this

alternative would not require the addition of workers and would therefore, not produce an increase in noise from private motor vehicles used by workers to commute to and from work.

Table 4.4–2. Permissible Noise Exposure

Duration Per Day, hours	Sound Level dBA Slow Response
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

Note: When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

Source: DOE 2001a.

4.4.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. The onsite and offsite acoustical environments would be impacted during construction of the proposed replacements/repairs to the three boilers and associated auxiliary systems of the existing Y-12 Steam Plant. Alternative 2, construction activities would consist mostly of internal building modifications and renovation. The level of noise would be representative of levels at a small-scale construction site. Table 4.4-1 describes peak attenuated noise levels expected from operation of construction equipment. Noise impacts from the use of heavy equipment would be the same as that of the Proposed Action.

Peak attenuated noise levels at offsite locations within the City of Oak Ridge from construction activities would be similar to background noise levels (53 to 62 dBA) as shown in Table 4.4-1.

The *Noise Control Act* of 1972 (42 U.S.C. §4901), and *Occupational Noise Exposure* (29 CFR 1910.95) include noise reduction and mitigation measures. Similar feasible administrative or engineered control and/or personal protective equipment would be used to reduce sound levels within acceptable levels. Continued compliance measures would be taken to ensure personnel do not experience hearing damage or loss.

Operation. Operation of upgraded equipment and systems would generate noise that is consistent with existing conditions. Operation under Alternative 2 would therefore have a negligible effect on ambient noise levels, and the facility would satisfy the noise regulations established by Anderson County (Table 3.4-1). Operation under this alternative would not require the addition of workers and would therefore, not produce an increase in noise from private motor vehicles used by workers to commute to and from work.

4.4.3 Alternative 3 – No Action Alternative

Construction. Under the No Action alternative, no new construction or land disturbing activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur, therefore there would be no impact on noise levels at the Y-12 Steam Plant.

Operation. Under the No Action alternative, no new construction or land disturbing activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur. The No Action alternative would not result in any changes to the current noise levels at the Y-12 Complex.

4.5 Water Resources

4.5.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. At the project site, minimal alteration of the natural drainage pattern of the surface water would occur during construction activities. The construction of the natural gas line across EFPC would follow the existing abandoned natural gas line route and be constructed on a pipe bridge across the EFPC. The construction activities are not expected to impact groundwater flow or quality therefore, no impacts are expected.

Minimal alteration of surface water flow drainage pattern due to excavation activities along the gas line extension and at the tie in location would be expected during construction activities. Some potential exists for temporary siltation due to surface erosion of construction and soil stockpile areas. This would be controlled by use of normal the Y-12 Complex construction techniques implementing best management practices (BMPs). In addition, DOE will prepare

and implement a Stormwater Pollution Prevention Plan (SWPP) in accordance with the Tennessee Erosion and Sediment Control Handbook. The SWPP will be prepared based on the scope of final design documents. If the Proposed Action's land disturbing activities are planned to exceed one acre, a Notice of Intent approval will be obtained from the TDEC prior to executing land disturbing activities. The installation of the underground gas line and facility construction are not expected to impact groundwater flow or quality therefore, no impacts are expected.

Operation. There would be no impacts to water resources beyond current conditions from the operation of the Proposed Action.

4.5.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. Construction activities are not expected to impact groundwater flow or quality.

Surface water flow drainage pattern would remain the same during excavation activities because the site for the boiler house has been previously developed. No effect to groundwater flow or quality is expected from the repair/replacement of existing Y-12 Steam Plant equipment. Surface erosion of the construction areas would be controlled by use of normal the Y-12 Complex construction techniques implementing BMPs.

Operations. There would be no impacts to water resources from the operation of Alternative 2.

4.5.3 Alternative 3 – No Action Alternative

Construction. Under the No Action alternative, no new construction activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur, therefore there would be no impact on the water resources at the Y-12 Steam Plant.

Operation. There would be no change to impacts to water resources from current operations. Average annual water use at the Y-12 Complex is approximately 2,000 million gal/yr; discharges are within NPDES requirements; and stormwater runoff and erosion control management

practices are ongoing. There would be no impact to groundwater under continued current operations.

4.6 Ecological Resources

4.6.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Under this Proposed Action, construction of boiler house and bulk oil storage would be on previously disturbed land and therefore would not impact ecological resources. In addition, DOE will prepare and implement a SWPP in accordance with the Tennessee Erosion and Sediment Control Handbook. The SWPP will be prepared based on the scope of final design documents. If the Proposed Action's land disturbing activities are planned to exceed one acre, a Notice of Intent approval will be obtained from the TDEC prior to executing land disturbing activities.

Operation. There would be no impacts to ecological resources from the operations of this alternative.

4.6.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. No impacts to ecological resources would occur under the Life Extension of the Existing Plant Alternative due to construction activities consisting of mostly internal building modifications and renovation.

Operation. There would be no impacts to ecological resources from the operations of this alternative because activities would be located in previously disturbed or heavily industrialized portions of the Y-12 Complex that do not contain sufficient habitat to support ecologically diverse species.

4.6.3 Alternative 3 – No Action Alternative

Construction. Under the No Action alternative, no new construction or land disturbing activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents are expected to occur.

Operation. There would be no change to impacts on ecological resources from current operations or what has been previously assessed.

4.7 Cultural Resources

4.7.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. The Y-12 Complex has been previously surveyed for the presence of cultural resources. The proposed construction site for the new boiler house and bulk oil storage is located in a previously disturbed area. The construction and laydown areas would be fenced during all construction activities to prevent activities from being conducted outside these areas, and erosion control measures would be implemented during construction.

There would be no effect to historic properties from construction of the new boiler house and bulk oil storage. The historic district includes much of the Y-12 Complex; however the proposed site is not located within the district or near the two buildings proposed for National Historic Landmark status or other properties eligible for inclusion in the National Register.

Operation. There would be no impact on historic properties from the operation the Proposed Action.

4.7.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. No historic properties included in or eligible for inclusion in the NRHP, pursuant to 36 CFR 60.4, would be affected by the construction of Alternative 2 because construction activities would consist mostly of internal building modifications and renovation.

Operation. There would be no impact on historic properties from the operation of Alternative 2.

4.7.3 Alternative 3– No Action Alternative

Under the No Action alternative, no new construction or other activities beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents would occur. There would be no impacts to historic properties.

4.8 Socioeconomics

Socioeconomic impacts are determined relative to the context of the affected environment. Projected baseline conditions in the ROI, as presented in Section 3.8, provide the framework for analyzing the importance of potential socioeconomic impacts that could result from implementation of the Proposed Action or Alternatives.

4.8.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Construction under the Proposed Action would require approximately 57,500 labor hours, and would have short- and long-term positive benefits on employment and income in the region. It is expected that most of the construction jobs would be filled by the existing labor force; having no noticeable effect on regional income, housing markets, or the demand for community services.

Operation. Currently, there are 20 full time employees running the Y-12 Steam Plant at a cost of approximately $4,500,000/yr. Operation of the new Steam Plant will require approximately 7 operators. There would be no net change in employment because the displaced 13 personnel would be transferred to other facilities at the Y-12 Complex. Maintenance of the new Steam Plant would be outsourced to the existing labor force. This would result in no noticeable effect on regional income, housing markets, or the demand for community services.

4.8.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. This alternative would require construction workers to make immediate repairs to the existing Y-12 Steam Plant. It is expected that most of the construction jobs would be filled by the existing labor force; having no noticeable effect on regional income, housing markets, or the demand for community services.

Operation. There would be no net change in employment because current personnel would be able to maintain and operate the Steam Plant.

4.8.3 Alternative 3 – No Action Alternative

Under No Action, none of the construction, needed repairs, or upgrades would be made immediately to the existing Y-12 Steam Plant. Instead, maintenance activities would continuously be conducted as each failure occurs. These activities would gradually increase in frequency and would be conducted by the existing labor force. There would be no construction workers employed from the pool of such workers in the ROI, and therefore there would be no short- or long-term positive benefits on employment and income in the region from construction work related to this action.

Operation. There would be no net change in employment since no change in operation would occur.

4.9 Environmental Justice

Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, environmental justice analyses identify and address any disproportionately high and adverse human health or environmental effects on minority or low-income populations. Adverse health effects may include bodily impairment, infirmity, illness, or death. Adverse environmental effects include socioeconomic effects, when those impacts are interrelated to impacts on the natural or physical environment.

Disproportionately high and adverse human health effects are identified by assessing these three factors:

- Whether the adverse health effects, which may be measured in risks or rates, are significant or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death.

- Whether health effects occur in a minority population or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

- Whether the risk or rate of exposure to a minority population or low-income population to an environmental hazard is significant and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group.
- As discussed in Section 3.9, of the three census tracts analyzed for the presence of minority and low-income populations, only census tract 020100, in Anderson County, meets the criteria for having a minority population. When considering the aggregate of the minorities, the sum of all minorities in the tract, the total percentage is more than 20 percentage points higher than the state percentage.

4.9.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

As discussed in Sections 4.1 through 4.13, Alternative 1 would pose no appreciable health and/or environmental risks to the public, and therefore, no disproportionately high and adverse effects to minority populations or low-income populations. In addition, there are no special circumstances that would result in disproportionately high and adverse impacts on minority or low-income populations from any exposure pathway. Therefore, there would be no environmental justice impacts.

4.9.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Environmental justice impacts from construction and operation would be similar to those described for Alternative 1, the Proposed Action.

4.9.3 Alternative 3 – No Action Alternative

Environmental justice impacts from construction and operation would be similar to those described for Alternative 1, the Proposed Action.

4.10 Traffic and Transportation Safety

4.10.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Under the Proposed Action there would be a minimal increase in traffic during construction of the boiler house building and storage facility. Construction related traffic would

add negligible number of additional worker vehicles per day. Minor traffic interruptions would be expected near the project site due to construction vehicles entering and leaving the site. Construction activities would be temporary and would not result in long-term effects.

Operation. Operations under Alternative 1 would not change level-of-service (LOS) on roads because the Y-12 Complex workforce would not increase and therefore, no extra worker vehicles would be on site. Coal truck deliveries for the existing Y-12 Steam Plant (approximately 12-15 delivers, 5 days/week) would be eliminated for a net reduction in traffic.

4.10.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. Under the Proposed Action there would be a minimal increase in traffic during construction of the boiler house building and storage facility. Construction related traffic would add negligible number of worker vehicles per day. Minor traffic interruptions would be expected near the project site due to construction vehicles entering and leaving the site. Construction activities would be temporary and would not result in long-term effects.

Operation. Operations under this alternative would not change LOS on roads, because the Y-12 Complex workforce would not increase and therefore no extra worker vehicles would be on site.

4.10.3 Alternative 3 – No Action Alternative

Primary roads on the ORR serving the Y-12 Complex include SRs 58, 62, 95, 170 (Bethel Valley Road) and Bear Creek Road. All are public roads except Bear Creek Road which traverses the ORR. Traffic statistics associated with No Action alternative are shown in Table 3.10–1. Average daily traffic on the ORR and area roads serving the Y-12 Complex ranges from 9,350 at Bethel Valley Road to 31,620 at SR 62. Major off-site area roads for long-distance transport of materials and waste include I-40, I-75, and I-81. There would be no change in traffic and transportation effects under the No Action alternative.

4.11 Occupational and Public Health and Safety

4.11.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Occupational hazards associated with construction of the facility would be considered standard industrial hazards. Such hazards are defined as meeting one of the following criteria: (1) routinely encountered or accepted by the public in everyday life; (2) encountered in general industry and significantly affecting a large number of people; or (3) encountered in general industry and controlled through the application of recognized codes and safety standards [e.g., OSHA standards]. Workers will comply with DOE Worker Safety and Health requirements in 10 CFR 851 and the Y-12 Complex safety provisions to mitigate the incidence of construction related injuries or illnesses.

All activities would be conducted in full accordance with DOE/NNSA policies regarding protection of personnel and the environment. Any materials removed from the construction site, such as wastes, would be contained and checked for radioactivity/toxicity and disposed of based on the content of the waste. To avoid exposure from potential spills of liquids during construction, construction personnel would be trained in accordance with the Y-12 Complex spill prevention control countermeasures and contingency plans.

Based on the seismic history of the area, a moderate seismic risk exists at the Y-12 Complex. However, this should not impact the construction and operation of the Boiler House Building System and storage facilities since the design criteria considers appropriate structural design factors for natural phenomena (seismic). There are no known currently active faults within or adjacent to the proposed project site. Slopes and underlying foundation materials are generally stable at the Y-12 Complex. The foundation soils are not susceptible to liquefaction.

Operation. Improvements to the existing Y-12 Steam Plant would result in a reduced risk to the Y-12 Complex workers and the surrounding public by replacing the aged boiler system with a new one.

The Proposed Action would require the transport, storage, use, and/or disposal of hazardous materials such as No. 2 fuel oil. The Proposed Action would not introduce any new hazardous materials.

4.11.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. Health and safety impacts from construction would be similar to those described for Alternative 1, the Proposed Action.

Operation. Improvements to the existing Y-12 Steam Plant would result in a reduced risk to the Y-12 Complex workers and the surrounding public by replacing/repairing the aged boiler system.

4.11.3 Alternative 3 – No Action Alternative

Under the No Action alternative, the existing Y-12 Steam Plant would continue to degrade and would require major maintenance in order to continue to operate or would have to be shut down. Furthermore, there would be an increased risk of system failure, resulting in a direct impact on the Y-12 Complex mission and on the health and safety of workers.

4.12 Waste Management

4.12.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Under the Proposed Action, a boiler house and storage facility would be constructed for the new packaged boiler system technologies and associated fuel on the site that is currently occupied by office buildings. The existing structures would be removed by the IR program. Waste and recycle materials would be surveyed or reviewed and tagged by Radiological Control personnel unless noted otherwise. Waste materials, not including recyclable materials, would be characterized and packaged in accordance with the requirements of the master waste profiles in effect at the time of generation.

Soil. There is a potential for soil disturbance during construction of the boiler house and fuel storage facility. If there is a necessity to excavate and replace with an engineered fill due to unsuitability for construction, the material removed, though not environmentally contaminated, may require disposal and would be handled according to the *Soil Management Plan for the Oak Ridge Y-12 National Security Complex* (Y/SUB/92-28B9923C-Y-5).

Storm water and groundwater. Control and discharge of storm water and groundwater would be in accordance with the BMP Plan and Storm Water Control. Environmental Compliance personnel would approve, on a case-by-case basis, any discharge to the storm drain that is not covered by the BMP Plan or Storm Water Control Plan.

Sanitary refuse. Sanitary refuse such as lunch bags, food waste, plastic, and paper would be deposited in green sanitary waste dumpsters or transported to the onsite Industrial Landfill V (ILFV) or state-approved landfill.

Wood. Scrap wood, including excess pallets would be segregated into painted or treated wood and unpainted or untreated wood. Painted or treated wood would be transported to the onsite Construction Demolition Landfill VII (CDL VII) or state-approved landfill. Unpainted untreated wood would be recycled (DOE 2005d).

Scrap metal. Unpainted scrap metal that has not been in a posted radiological area and that is approved by Radiological Control personnel for release to the public would be recycled. Scrap metal that is generated from a posted radiological area cannot be recycled. Clean scrap metal would be transported to the onsite CDL VII for disposal. Painted metal with PCB concentrations of 50 ppm or greater would be managed as bulk PCB regulated waste. Radiologically-contaminated metal with bulk PCB concentration of 50 ppm or greater would be containerized as mixed waste.

Asphalt and concrete. Asphalt and concrete would be surveyed and evaluated by Radiological Control personnel before being disturbed. Any radiologically-contaminated asphalt or concrete would be removed and containerized as low-level radioactive waste (LLRW) and managed in accordance with Procedure Y71-936, *Radioactive Waste Management at the Y-12 Complex*. Asphalt and concrete approved by Radiological Control personnel would be transported to the onsite CDL VII for disposal.

Sewer pipe. Clay, concrete or cast iron pipe from storm and sanitary sewer lines may be encountered. Pipe that can be approved by Radiological Control personnel would be disposed of in CDL VII. Large accumulations of sediment within the pipe should be evaluated by the Environmental Compliance organization to determine the need for sampling for possible

hazardous constituents. Pipe that is determined to be radiologically-contaminated would be containerized for disposal as LLRW.

Asbestos insulation. Friable asbestos-containing materials (ACM), such as insulation, that can be approved by Radiological Control personnel would be packaged and sealed tightly in double-bagged 6-mil-thick plastic bags, double-wrapped 6-mil-thick plastic sheeting, or secured in drums or boxes. Asbestos insulation would be removed from pipes greater than 20 cm (8 in) in diameter. Insulation may be left on pipes with diameter of 20 cm (8 in) or less, and the entire waste may be managed as ACM. ACM approved by Radiological Control personnel would be disposed of as a special waste onsite at ILFV.

Non-asbestos insulation. Non-asbestos insulation would be surveyed by Radiological Control personnel before removal. Insulation that can be approved by Radiological Control personnel would be packaged and tightly sealed in single 6-mil-thick plastic bags, wrapped in 6-mil-thick plastic sheets, fiber drums, metal drums, plywood boxes, or metal boxes. The packages would be transported to ILFV by the construction subcontractor in such a manner to prevent airborne release or loss of the waste.

Corrugated cardboard and aluminum beverage cans. Corrugated cardboard and aluminum beverage cans would be recycled.

There would be no environmental impact resulting from waste management of generated wastes from the Proposed Action.

Operation. The waste generation (feedwater treatment system waste streams and boiler blowdown waste streams) from the operation of Alternative 1, the Proposed Action, would be less than current waste generation because the new boiler system would be producing less than half of the current steam production.

4.12.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. It is anticipated that impacts to current waste management at the Y-12 Complex from replacement and repair activities would be greater than those described for Alternative 1, Because of its current condition, the existing Y-12 Steam Plant would require extensive

renovation to or replacement of many of its existing systems and components including the coal-handling system, feedwater system forced-draft system, induced-draft system, ash-handling systems, and plant control and electrical systems and would therefore generate more waste than those described for Alternative 1.

Operation. There would be no change to current waste generation from the operation of Alternative 2.

4.12.3 Alternative 3 – No Action Alternative

Construction. It is anticipated that impacts to current waste management at the Y-12 Complex under the No Action Alternative would be similar to those described for Alternative 2, but on a lower scale. As discussed for Alternative 2, the existing Y-12 Steam Plant would require extensive renovation and replacement of many of its systems however, under this alternative renovation and replacement of systems would occur on an as needed basis and impacts would be spread over a longer timeframe.

Operation. Under the No Action Alternative, there would be no change to waste generation from that of current operations; however, there is a potential that as existing Y-12 Steam Plant systems fail waste generation could increase as a result of systems' continuing to deteriorate, becoming more unreliable, and obsolete.

4.13 Visual Resources

The visual resources analysis considers a ROI which includes those lands from which the Y-12 Complex is visible (viewshed). Impacts to the ROI include those associated with changes in the existing landscape character resulting from construction activities and operations under the No Action and action alternatives.

4.13.1 Alternative 1 – Skid Mounted Gas Fired Boilers (Proposed Action)

Construction. Under the construction of the Proposed Action, cranes and/or construction equipment would create short-term visual impacts. Construction staging and lay-down areas would be located at the proposed project site and existing roads would be used to support

construction needs. Temporary construction fencing would also be installed during construction activities.

Short-term visual impacts associated with construction activities (dust, equipment exhaust, etc.) would be limited to the construction staging and lay-down areas and the immediate construction site of the boiler house building and storage facilities.

Operation. The Y-12 Complex is consistent with VRM Class IV which is used to describe a highly developed area. Most of the land surrounding the Y-12 Complex would be consistent with VRM Class II and III (i.e., left to its natural state with little to moderate changes). The stacks associated with the packaged boiler system technologies would be taller than the boiler house building being constructed and the adjacent buildings; however the overall visual classification of the Y-12 Complex would not change.

4.13.2 Alternative 2 – Life Extension of the Existing Plant Alternative

Construction. There would be no visual impact under the Life Extension of the Existing Plant Alternative because all replacements/repairs would be confined to indoors only.

Operation. There would be no change to the current viewshed at the Y-12 Complex under the operations of Alternative 2.

4.13.3 Alternative 3 – No Action Alternative

Under the No Action alternative, no new construction or other activities that would disturb the viewshed of the Y-12 Complex would occur beyond those previously assessed in the Y-12 SWEIS (DOE 2001a) and subsequent NEPA documents. Therefore, no impacts to visual resources are anticipated.

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